



# Social capital and pet ownership – A tale of four cities#

## Citation

Wood, Lisa, Karen Martin, Hayley Christian, Steve Houghton, Ichiro Kawachi, Shannen Vallesi, and Sandra McCune. 2017. "Social capital and pet ownership – A tale of four cities#." SSM - Population Health 3 (1): 442-447. doi:10.1016/j.ssmph.2017.05.002. <http://dx.doi.org/10.1016/j.ssmph.2017.05.002>.

## Published Version

doi:10.1016/j.ssmph.2017.05.002

## Permanent link

<http://nrs.harvard.edu/urn-3:HUL.InstRepos:34869042>

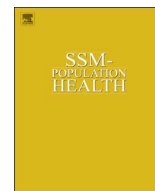
## Terms of Use

This article was downloaded from Harvard University's DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at <http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA>

# Share Your Story

The Harvard community has made this article openly available.  
Please share how this access benefits you. [Submit a story](#).

[Accessibility](#)



## Article

Social capital and pet ownership – A tale of four cities<sup>☆</sup>

Lisa Wood<sup>a,\*</sup>, Karen Martin<sup>a</sup>, Hayley Christian<sup>a</sup>, Steve Houghton<sup>b</sup>, Ichiro Kawachi<sup>c</sup>,  
Shannen Vallesi<sup>a</sup>, Sandra McCune<sup>d</sup>

<sup>a</sup> School of Population and Global Health, The University of Western Australia (M431), 35 Stirling Highway, Crawley, WA 6009, Australia

<sup>b</sup> Faculty of Education, The University of Western Australia (M431), 35 Stirling Highway, Crawley, WA 6009, Australia

<sup>c</sup> Department of Social and Behavioral Sciences, Harvard School of Public Health, 677 Huntington Avenue, Kresge Building 7th Floor, Boston, MA 02115, USA

<sup>d</sup> WALTHAM Centre for Pet Nutrition, Freaby Lane, Waltham on the Wolds, Leicestershire, UK

## 1. Introduction

The erosion of sense of community and social capital in modern societies is a common lament. With accumulating evidence about how social and psychosocial supports are related to overall health and wellbeing, pet ownership is emerging as a valuable and positive feature in community and neighborhood life. Social capital has gained considerable traction over the last two decades in public policy discourse, and has been imputed to have benefits for a range of settings and contexts including neighborhoods, workplaces, families and virtual communities. The development and maintenance of social capital are increasingly incorporated in claims that support a wide range of policies and community initiatives: some relating to urban design, urban renewal, and others to community building.

There are various definitions of social capital, often themed around people receiving some common benefit from interacting with each other, and some notion of collective societal benefit derived from these interactions. Putnam's (2001) definition of social capital is one of the most widely used, defining it as the "connections among individuals, social networks and the norms of reciprocity and trustworthiness that arise from them" (p. 19). Most simply, social capital has been described as the "glue" that holds society together (Lang & Hornburg, 1998) or the raw material of civil society that is created from everyday interactions between people (Onyx & Bullen, 1997). Social capital can stem from many sources; for example it is being created and applied when people (individually or as groups and organisations) lend a helping hand, get involved in community issues, interact with local residents, volunteer, share useful contacts and skills, or work towards a common goal (Halpern, 2005).

Whilst the social interactions associated with pets have been explored through different research methodologies and disciplinary lenses, the relationship between pet ownership and social capital has been far less considered. Despite wide citation and media interest in our earlier study about pets and social capital published (Wood, Giles-Corti, & Bulsara, 2005), the research remains one of the few empirical

studies of its kind. In the 2005 study, completed via a community survey of 339 residents in Perth, we found that pet owners scored significantly higher compared with non-pet owners on an overall social capital scale whilst controlling for demographics. Moreover, the results indicated that social capital was higher among all pet owners, and was limited to those who owned dogs (often argued to be the pet type most likely to precipitate community engagement) (Wood et al., 2005).

The notion that pets can facilitate social capital goes beyond the more commonly investigated role of pets as a social icebreaker between strangers, or as a catalyst for social interaction (Hunt, Hart, & Gomulkiewicz, 1992; McNicholas & Collis, 2000; Messent, 1983; Newby, 1997; Robins, Sanders, & Cahill, 1991; Wood, 2010). When viewed through a social capital lens for example, we are interested in whether the social interactions facilitated by pets have a wider ripple effect on social trust or the 'ties that bind' communities together as a civil society (Wood, 2010). Moreover, one of the hallmarks of social capital is that it can be generated and shared among people who may not be known to each other. The example of a widow living alone who benefits from the collective goodwill of neighbours in looking out for each other is one illustration of this (Kawachi, Kennedy, Lochner, & Prothrowstith, 1997).

This study set out firstly to test whether the previously observed relationship between pet ownership and social capital in our original Perth study (Wood et al., 2005) still holds true over a decade later, and in an American as well as Australian context. Secondly, this research examines the extent to which dog ownership or dog walking explains the potential nexus between pets and social capital.

## 1.1. Aims

The Pet Connections study aimed to investigate the relationship between pet ownership and social capital and includes four urban study sites: three in the United States (U.S.); San Diego, Portland, and Nashville, and one in Australia; Perth. A secondary aim was to investigate whether dog ownership, and in particular dog walking,

<sup>☆</sup> The authors have no conflict of interest to declare.

\* Corresponding author.

E-mail addresses: [lisa.wood@uwa.edu.au](mailto:lisa.wood@uwa.edu.au) (L. Wood), [karen.martin@uwa.edu.au](mailto:karen.martin@uwa.edu.au) (K. Martin), [hayley.christian@uwa.edu.au](mailto:hayley.christian@uwa.edu.au) (H. Christian), [stephen.houghton@uwa.edu.au](mailto:stephen.houghton@uwa.edu.au) (S. Houghton), [ikawachi@hsph.harvard.edu](mailto:ikawachi@hsph.harvard.edu) (I. Kawachi), [shannen.vallesi@uwa.edu.au](mailto:shannen.vallesi@uwa.edu.au) (S. Vallesi), [sandra.x.mccune@effem.com](mailto:sandra.x.mccune@effem.com) (S. McCune).

<http://dx.doi.org/10.1016/j.ssmph.2017.05.002>

Received 9 February 2017; Received in revised form 4 May 2017; Accepted 4 May 2017

2352-8273/© 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

were the mechanisms through which pet ownership might contribute to social capital.

## 2. Methods

### 2.1. Study design

This study was originally designed to be undertaken in a city from each of two countries (Perth, Australia and San Diego, U.S.) that had comparable population demographics, climate, coastal geography and residential density. This was then expanded to include two other U.S. cities; low-medium residential density and moderate climate remained a common criteria for these locations, but they were selected from differing geographic areas (Portland in the north-west, and Nashville in the south-east).

The study design was based on the previous smaller study undertaken in Perth (Wood et al., 2005). A cross-sectional design, entailing telephone surveying of a randomized population sample, was used to collect data across four sites: Perth, Australia (April to June 2012); San Diego, Nashville, and Portland, U.S. (September to December 2012). Data collection was scheduled to coincide with the autumn to early winter season in each country. Ethics approval for the study was provided by The University of Western Australia Human Research Ethics Committee.

### 2.2. Participants/sample/data collection

The sample size calculation was based on the social capital difference observed between pet and non-pet owners in our first study of this kind a decade ago. The calculation was performed using SAS 9.2 and the Power and Sample Size 3.1. A total of 2692 respondents (San Diego  $n=690$ ; Nashville  $n=664$ ; Portland  $n=634$ ; Perth  $n=704$ ) participated (statistical power of  $> 80\%$  at  $\alpha = 0.05$ ; response rate 47.34%).

The telephone survey was conducted using Computer Assisted Telephone Interviewing (CATI). In both countries the survey was undertaken by an independent research agency with expertise in telephone based population surveys. Protocols were developed by the research team to ensure standardization of data collection methods in all four cities. Quota specifications were used to ensure a population representative cross-section of sex, age group, and neighborhood socioeconomic status. To be eligible, participants had to be aged  $\geq 18$  years and to have lived in their neighborhood for at least one year.

### 2.3. Measures

The overall survey instrument included items that measured social capital, sense of community, pet ownership, and demographics. The social capital scale (SCS) has been validated in a previous study of social capital (Wood et al., 2005) – this SCS was developed through factor analysis, and had intra-class correlation coefficients (ICCs) ranging between 0.74 and 0.92 for its six component subscales (general helpfulness, friendliness, trust, reciprocity, civic engagement, and neighborhood networks (Wood et al., 2005)). In the present study, the same SCS scale items were used, but for questions with a likert scale response, these were modified to take the form of a 4 rather than 5 point likert scale. The component items for the social capital scale are described in Table 1. The social capital subscales were summed to form the overall SCS score (range = 9–51;  $M = 32.53$ ;  $SD = 6.75$ ).

Further questions were asked of pet owners relating to type of pet(s) owned, and friendships and social support derived from people met through pets. These items were developed specifically for this study. Pet owners who owned a dog(s) were asked about whether they walked their dog or not. The questions relating to dog walking were validated in a previous study (Cutt, Giles-Corti, Knuiman, & Pikora, 2008).

With the exception of minor modifications made to the wording of

**Table 1**  
Social capital scale and component items.

Measure	Number of items	Response coding	Content description	Mean	SD	Cronbach's alpha
<b>General helpfulness</b> (range: 1–4)	1	4 point Likert scale <sup>a</sup>	In general, would you say that most of the time people are willing to help each other out?	2.12	0.64	
<b>Friendliness</b> (scale score range: 3–12)	3	1–4 Likert scale <sup>a</sup>	Would you disagree or agree with the following statements about your neighborhood: people who live here usually say hello to each other, for example if they are out walking or in their gardens; neighbors are often seen chatting to each other; a stranger moving into this neighborhood would be made to feel welcome	6.32	1.68	0.78
<b>Trust</b> (scale score range: 3–12)	3	4 point Likert scale <sup>a</sup>	Would you disagree or agree that: you can trust most people living in your section of your street or block; you can trust most people living in your neighborhood; you can trust most people generally	6.19	1.65	0.71
<b>Reciprocity</b> (range: 0–12)	12	(1 = yes, 0 = no)	Activities undertaken in the last year a) for a neighbor or someone living in your neighborhood b) by a neighbor or someone living in your neighborhood for me: looked after house or garden while away; collected mail or newspaper; minded, fed or walked pet; lent household or garden items or tools; helped with odd jobs or provided transport; another type of favor	5.88	3.28	0.81
<b>Civic engagement</b> (range: 0–7)	7	(1 = yes, 0 = no)	Activities done in neighborhood in past year: volunteering or volunteer work; participated in a sporting or recreational club or activity; participated in a community group or club; attended a local community event; taken some action on a local issue; picked up other people's rubbish in a public place; made a donation	3.70	1.88	0.67
<b>Neighborhood networks</b> (range: 0–5)	1	(0 = none, 1 = 1–3, 2 = 4–6, 3 = 7–10, 4 = 11–14, 5 = 15 +)	If you had a serious personal crisis or problem, how many people within this neighborhood do you feel that you could turn to for comfort and support?	1.33	1.10	

<sup>a</sup> strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4.

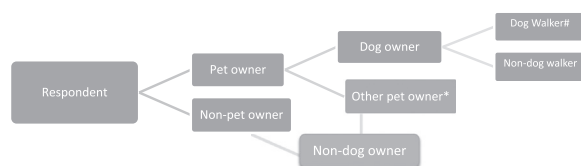


Fig. 1. Pet, dog and dog walking sample categorizations for analysis. \* Other includes cat, fish, birds and other types of pets. # respondent reports walking the dog.

three items of the U.S. version of the survey to accommodate cultural differences, the survey questions and interview methodology were identical in both countries (for example 'garden' replaced with 'yard', and 'rubbish' with 'trash').

Demographic variables included age, gender, dependent children, highest education level, ethnicity, country of birth, and years lived in neighborhood (see Table 1 for variable categories).

## 2.4. Analysis

All analyses were conducted using SPSS Statistics 22 (George & Mallery, 2012) with a significance value (alpha) set at 0.05.

Table 1 displays descriptive statistics for overall social capital scores and subscales.

For the purposes of comparative analysis, variables were created to categorize respondents (see Fig. 1) by pet ownership (pet owned or non-pet ownership), then dog ownership (dog owned or other pet owned) then dog walkers (dog walker or non-dog walker).

Comparative analysis explored the relationship between pet ownership, dog ownership and dog walking with social capital scores with adjustment for demographics. This involved generating statistical models with social capital as the dependent variable (models described further below). When whole sample data were used (i.e. from all four sites) multilevel modelling (Goldstein, 2003) was completed to account for similar behavior that occurs in specific locations (clustering).

Table 2  
Sample characteristics.

	TOTAL n = 2692 (%)	San Diego n = 690 (%)	Portland n = 634 (%)	Nashville n = 664 (%)	Perth n = 704 (%)
<b>Age group<sup>a</sup></b>					
18–29 years	401 (14.9)	165 (23.9)	62 (9.8)	87 (13.1)	87 (12.4)
30–39 years	486 (18.1)	146 (21.2)	137 (21.6)	138 (20.8)	65 (9.2)
40–49 years	502 (18.6)	111 (16.1)	142 (22.4)	143 (21.5)	106 (15.1)
50–59 years	524 (19.5)	109 (15.8)	121 (19.1)	120 (18.1)	174 (24.7)
60+ years	742 (27.6)	152 (22.0)	158 (24.9)	164 (24.7)	268 (38.1)
<b>Sex</b>					
Male	1272 (47.3)	353 (51.2)	287 (45.3)	287 (43.2)	345 (49.0)
Female	1420 (52.7)	337 (48.8)	347 (54.7)	377 (56.8)	359 (51.0)
<b>Highest education level<sup>b</sup></b>					
Secondary or less	859 (31.9)	195 (28.3)	169 (26.7)	207 (31.2)	288 (40.9)
Vocational training	656 (24.4)	178 (25.8)	149 (23.5)	137 (20.6)	192 (27.3)
Bachelor degree or higher	1075 (39.9)	285 (41.3)	286 (45.1)	292 (44.0)	212 (30.1)
Other	50 (1.9)	13 (1.9)	16 (2.5)	15 (2.3)	6 (0.9)
<b>Ethnicity (U.S. survey only)</b>					
White/Caucasian	1417 (71.3)	381 (55.2)	550 (86.8)	486 (73.2)	–
Hispanic or Latino Descent	203 (10.2)	168 (24.3)	19 (3.0)	16 (2.4)	–
Black/African American	200 (10.2)	60 (8.7)	14 (2.2)	126 (19.0)	–
Asian	41 (2.1)	34 (4.9)	19 (3.0)	14 (2.1)	–
Other	70 (2.6)	36 (5.2)	19 (3.0)	15 (2.3)	–
<b>Country of birth (Aust. Survey)</b>					
Australia	–	–	–	–	446 (63.4)
Overseas	–	–	–	–	257 (36.6)
<b>Number children living in household<sup>c</sup></b>					
None	1792 (66.6)	438 (63.5)	411 (64.8)	439 (66.1)	504 (71.6)
One	354 (13.2)	100 (14.5)	79 (12.5)	102 (15.4)	73 (10.4)
Two	354 (13.2)	82 (11.9)	103 (11.0)	73 (11.0)	96 (13.6)
Three or more	167 (6.2)	63 (9.1)	31 (4.9)	44 (6.6)	29 (4.1)
<b>Time lived in neighborhood</b>					
1–3 years	447 (16.6)	154 (22.3)	88 (13.9)	121 (18.2)	84 (11.9)
4–9 years	538 (20.0)	154 (22.3)	144 (22.7)	135 (20.3)	105 (14.9)
10–14 years	459 (17.1)	101 (14.6)	113 (17.8)	97 (14.6)	148 (21.0)
15–20 years	332 (12.3)	51 (7.4)	79 (12.5)	88 (13.3)	114 (16.2)
More than 20 years	916 (34.0)	230 (33.3)	210 (33.1)	223 (33.6)	253 (35.9)
<b>Pet ownership factors</b>					
<b>Pet ownership</b>					
Pet owner	1579 (58.7)	378 (54.8)	384 (60.6)	388 (58.4)	429 (60.9)
Non-pet owner	1113 (41.3)	312 (45.2)	250 (39.4)	276 (41.6)	275 (39.1)
<b>Type of pet</b>					
Dog owner	1113 (41.3)	276 (40.0)	233 (36.8)	296 (44.6)	308 (43.8)
Other pet owner	466 (17.3)	102 (14.8)	151 (23.8)	92 (13.9)	121 (17.2)
<b>Dog walking behavior</b>					
Dog walker	623 (23.1)	142 (20.6)	123 (19.4)	155 (23.3)	203 (28.8)
Non-dog walker	490 (18.2)	134 (19.4)	110 (17.4)	141 (21.2)	105 (14.9)
<b>Got to know neighbor through pet</b>					
Dog owner (n = 1113)	683 (61.4)	166 (60.1)	143 (61.4)	181 (61.1)	193 (62.7)
Other pet owner (n = 466)	126 (27.0)	27 (26.5)	40 (26.5)	23 (25.0)	36 (29.8)

Missing data.

<sup>a</sup> 37.

<sup>b</sup> 52.

<sup>c</sup> 25.

### 2.4.1. Social capital for pet owned compared with no pet owned

A General Estimating Equation (GEE) model (adjusting for site clustering) was generated to examine the association between the overall continuous social capital score (dependent) and pet ownership adjusting for age group, sex, highest educational level, and number of children living in household (Model 1, see Table 4). Due to a significant relationship between number of children living in household and pet ownership, separate models were generated for each category (i.e. no children and one or more children). These models resulted in similarly significant associations between pet ownership and social capital for both populations (no children  $p < 0.001$ ; one or more children  $p = < 0.001$ ); thus the initial Model 1 was retained as the final overall pet ownership model.

### 2.4.2. Site specific social capital for pet owned compared with no pet owned

Linear regression models (Models 1a–1d) were then generated for each site examining social capital scores in relation to pet ownership. Each model was adjusted for age group, sex, highest educational level, and number of children living in household.

### 2.4.3. Social capital for dog owned compared with other pet owned

Another GEE model (Model 2) was generated to examine if type of pet owned (specifically dog ownership and other pet ownership) was associated with social capital. This model incorporated the social capital score variable and age group, sex, highest educational level, and number of children living in household with dog, other pet or no pet owned. This model also adjusted for site clustering.

Two final GEE models were generated for dog walking. Model 3 examined the differences between social capital of those who walk the dog, those who do not walk their dog and those who do not own a dog (other pet owners plus non-pet owners) while adjusting for age group, sex, highest educational level, number of children living in household and site. Model 4 compared social capital for dog owners who walked their dogs and dog owners who did not walk their dog again adjusting for age group, sex, highest educational level, number of children living in household and site.

## 3. Results

### 3.1. Sample characteristics and pet ownership

Overall, 58.7% of respondents owned one or more pets, with the majority of pet owner respondents owning a dog (41.3%). The level of pet ownership in all four cities was comparable to other available population prevalence data on pet ownership: 54.8% of the San Diego sample, 58.4% of the Nashville sample and 60.6% of the Portland sample owned a pet (compared with a U.S. pet ownership rate of around 56% (American Veterinary Association, 2012)) and 60.9% of the Perth sample owned a pet (compared with estimated pet ownership rates in Australia of 63% (Animal Health Alliance, 2013)).

Table 2 displays descriptive statistics for each demographic variable (overall and by study site).

### 3.2. Any pet ownership and social capital

Bivariate analysis indicated that pet owners had a significantly higher mean social capital score than non-pet owners across the overall sample (33.21 pet owners, 31.57 non-pet owners;  $p < 0.001$ ). Table 3 displays social capital summary statistics by pet ownership and city.

The GEE Model 1 (Table 4) indicates that, when adjusting for age, sex, education, number of children living in the household and site, pet ownership was significantly associated with social capital; pet owners scored higher social capital (95% CI 1.35, 2.05) compared with non-pet owners ( $p < 0.001$ ).

When examined by site (Models 1a–1d), a significantly higher mean social capital score was found for pet owners compared with non-pet

**Table 3**

Social capital summary statistics by pet ownership and city.

	Non-pet owner (reference group)		Pet owner		Difference between groups <i>p</i> -value
	Mean <sup>a</sup>	sd <sup>a</sup>	Mean <sup>b</sup>	sd <sup>b</sup>	
<b>All study sites<sup>a</sup></b> ( <i>n</i> = 2692)	31.57	6.80	33.21	6.63	<b>&lt; 0.001</b>
San Diego ( <i>n</i> = 690)	30.88	6.84	32.43	6.77	<b>0.003</b>
Portland ( <i>n</i> = 634)	32.43	6.44	33.88	6.66	<b>0.007</b>
Nashville ( <i>n</i> = 664)	31.72	7.34	34.27	6.88	<b>&lt; 0.001</b>
Perth ( <i>n</i> = 704)	31.39	6.23	32.33	6.26	<b>0.045</b>

<sup>a</sup> Adjusted for age, sex, education, number of children living in the household and site clustering.

<sup>b</sup> Adjusted for age, sex, education and number of children living in the household.

owners in all four cities (see Table 3).

### 3.3. Type of pet owned and social capital

When social capital scores of those with no pets were compared with those of dog owners and with other pet owners, dog owners ( $p < .000$ , 95% CI 1.19, 2.30) as well as other pet owners ( $p = 0.03$ , 95% CI 0.36, 1.78) had significantly higher scores; however the average social capital score was higher for dog owners than other pet owners.

### 3.4. Dog walking and social capital

Dog walkers ( $p < .000$ , 95% CI 1.18, 2.40) and non-dog walkers ( $p < .006$ , 95% CI 0.28, 1.62) recorded higher social capital when compared with non-dog owners (other pet owners combined with non-pet owners). However, dog walkers experienced significantly higher social capital than non-dog walkers ( $p = 0.037$ , 95% CI 0.05, 1.59).

## 4. Discussion

Owning a pet is significantly associated with higher social capital compared with not owning a pet at all, and this positive association with social capital was not confined to dog ownership, and was consistent across residents surveyed in the three US and one Australian city. These findings thus provide important temporal and international validity to our previous study on pets and social capital undertaken in Perth Australia over a decade ago and with a much smaller sample size (Wood et al., 2005).

Given pets are entrenched in the lives and homes of many people in a growing number of countries, it is plausible that the pets and social capital nexus may prevail also in other nations, beyond the US and Australia. This is not just a social nicety or quirky sociological observation, as social capital is predictive of a raft of important social indicators (Halpern, 2005), including those pertaining to mental health, mortality, child development, crime and safety and economic resilience. Factors that erode social capital tend to be more readily identified in public policy and popular discourse, so there is novel appeal in tapping into the high rates of pet ownership that exist already in many countries as a conduit for strengthening the social fabric of local communities.

It was hypothesized that dogs and dog walking may be more likely to be related to higher social capital. This was true to some extent as, when compared with non-pet owners, those owning a dog experienced higher average social capital than those owning other pet/s. Further, dog walkers were more likely to have a higher social capital score than dog owners who reported that they did not walk their dog. The stronger associations observed for dog walkers may in part be related to the role of dog walking as a mechanism for improved natural surveillance and increased perceptions of safety within a neighborhood, both of which



**Table 4**

Adjusted association between social capital and pet ownership, dog ownership and dog walking.

Model	Category	B	SE	95% CI	p- value
1. Pet owner versus non pet owner; all sites	reference (non-pet owner)				
	pet owner	1.545	0.260	1.03, 2.05	< 0.001
1a. Pet ownership; San Diego	pet owner	1.556	0.522	0.53, 2.58	0.003
1b. Pet ownership; Portland	pet owner	1.434	0.532	0.39, 2.48	0.007
1c. Pet ownership; Nashville	pet owner	2.545	0.557	1.45, 3.64	< 0.001
1d. Pet ownership; Perth	pet owner	0.969	0.482	0.02, 1.92	0.045
2. Dog, other pet vs no pet ownership	reference (non-pet owner)				
	dog owner	1.747	0.282	1.19, 2.30	< 0.001
	other pet owner	1.073	0.363	0.36, 1.78	0.003
3. Dog walker, non- dog walker vs non- dog owner	reference (non-dog owner)				
	dog walker	1.792	0.312	1.18, 2.40	< 0.001
	non-dog walker <sup>a</sup>	0.948	0.341	0.28, 1.62	0.006
4. Dog walker vs non dog walker <sup>b</sup>	reference (non-dog walker)				
	dog walker	0.822	0.394	0.05, 1.59	0.037

SE; standard error, CI; confidence interval, B; beta coefficient.

<sup>a</sup>adjusted for age, sex, education, number of children living in the household and site.<sup>a</sup> owns dog but does not walk dog.<sup>b</sup> dog owners only.

have implications for people's movement within their local community (Christian et al., 2016).

Pets other than dogs were also shown in our study to precipitate conversation and interaction among neighbors, and we contend that even incidental social interactions can contribute to enhanced social capital, as people are then less likely to feel that they live amongst total strangers (Cattell, Dines, Gesler, & Curtis, 2008; Wood et al., 2005). In this study, 27% of people who owned pets other than dogs said they got to know neighbors through pets. In the analysis of qualitative responses to a question that asked respondents to elaborate on how they had met people through a pet, there were many examples that illustrated this, ranging from pets precipitating the first meeting between neighbors, pets being a topic of conversation over the fence or when out in the yard, through to children wanting to 'meet' a novel type of pet (Wood et al., 2015).

The fact that social capital was higher among not only dog owners may have a number of alternative explanations that merit further exploration. One hypothesis is that pets (of any kind) may be linked to perceptions of trust, a central tenant of social capital. Some observational studies have found that the presence of a companion animal enhances perceptions of the trustworthiness of other people (Guéguen & Ciccotti, 2008; Schneider & Harley, 2006). Other experimental evidence suggests that oxytocin may enhance people's trust of others (Zak, Kurzban, & Matzner, 2005), and this could tie in to other research indicating that dog owner's oxytocin levels are boosted when they interact with their pet dogs, through mutual gaze (Nagasawa, Kikusui, Onaka, & Ohta, 2009) or kissing (Handlin, Nilsson, Ejdebäck, Hydring-Sandberg, & Uvnäs-Moberg, 2012). We might hypothesise that pet-owners experience a rise in oxytocin regardless of the type of pet (i.e. that cat owners might benefit as much from a boost in oxytocin as dog owners) and that this may contribute to enhanced feelings of trust and higher levels of social capital observed among all pet owners. Pets of many types can also break down social inhibitions towards strangers, and as articulated by Newby, "the presence of a pet seems to 'normalise' social situations, getting everyone through the ice-breaker stage to the point where they can risk directly engaging with the unfamiliar person" (Newby, 1997 p. 180).

That social capital was associated with pet ownership across all four cities (one in Australia and three in the US), and in data collected nearly a decade after our first study associating pets and social capital (Wood, 2005) confirms that the original findings were not an artefact of a single locality at a particular point in time. Our findings here are also timely, with growing calls in the literature for the influence of pets in society to

be taken more seriously than it has been in the past. Brook's recent paper on the benefits for people with mental illness is one example of this, finding that pets could fulfil a unique role in individuals' networks of support, and have demonstrable benefits for people with poor mental health (Brooks, Rushton, Walker, Lovell, & Rogers, 2016).

What then are the policy and practice implications of our findings? Our results support firstly the merits of 'pet-friendly' cities. Whilst there is no 'one size fits all' model of a pet friendly city, and cultural mores and local laws and policies need to be taken into account; housing and accommodation pets for those who wish to own a pet is an important starting point. In Australia for example, pets have traditionally been more likely owned by people living in detached housing with backyards, with many apartment complexes and retirement villages still defaulting to a 'no pets' policy (PIAS, 2010; Wood, 2009). By contrast, there are cities in Europe and the U.S. with a longer history of higher density apartment style living where pets are more readily accepted in residences of this type (PIAS, 2010), or there is greater leniency around pets in rental properties (Zimalag & Krupa, 2009). Given aging populations, housing affordability and the need to curb urban sprawl are critical social trends common to many countries (including the US and Australia), notions of who can own a pet and where they can live needs to keep abreast of the times. The walkability of communities and the presence of parks and open space is also an important consideration if our towns and cities are to be pet friendly. Whilst our results showed that social capital can be precipitated by owning pets other than dogs, canines are nonetheless the most common type of pet, and dog walking in mainstream parks and public open spaces (with the proviso of picking up after one's dog) has been shown to precipitate social interactions that are not limited only to dog owners (Wood et al. 2008). Seeing people in the community walking their dogs, and socially interacting with others as a by-product of this, may also have a halo effect, whereby overall perceptions of sense of community are enhanced (Wood, Giles-Corti, Bulsara, & Bosch, 2007).

A second and perhaps more philosophical implication of our findings relates to the vital importance of social connections, trust and tolerance in our communities. These are hallmarks of social capital, and yet social, political and media commentary often laments their erosion in this modern era of social media, frenetic 'busyness' and global uncertainty. As articulated in Sheryl Turkle's recent book, *Alone Together* (Turkle, 2012) the ways in which people interact and forge relationships has undergone massive change, and continues to do so. By contrast, humans have been drawn to companion animals since early civilization, and they remain a relative constant in many people's lives;

a tangible constant that our findings suggest can yield positive social capital benefits of an enduring kind.

#### 4.1. Strengths and limitations

The large sample size of this study is a strength, as much of the research in the human animal interaction (HAI) field has often been hindered by methodological limitations such as small sample sizes (Kazdin, 2011). Data were collected from multiple cities from two different countries using validated instruments. The response rate and demographic profile of participants indicates that the results are reasonably representative of the populations studied. It is acknowledged however, that due to purposive selection the four selected cities are not representative of the two countries, and this may limit the generalizability of findings to the national level. However, the similarity of findings do indicate this trend is likely to exist in urban cities within high income countries. The role of pets in social relationship formation may vary according to cultural context, urbanity, built environment characteristics, meteorological climate, among other factors.

As with all cross-sectional studies, the findings do not establish causality. For example, wanting to own a pet, as well as ease of interacting with strangers or making new friends may be influenced by an unobserved third variable, such as sociability, extraversion, or some other personality/temperamental characteristic also related to social capital. Inclusion of owner personality measures in future studies would enable testing of this hypothesis.

#### 5. Conclusion

This study provides unique empirical evidence from cities in two countries to support the role that pet ownership might play to facilitate neighborhood social capital. Pet ownership is significantly associated with higher levels of social capital, irrespective of the type of pet owned. Given the high rate of pet ownership in many countries, pets are an under-recognized conduit for building social capital and strengthening the social fabric of communities.

#### Acknowledgements

This research was funded by a grant from the WALTHAM Centre for Pet Nutrition (a subsidiary of Mars Petcare).

#### References

- American Veterinary Association (2012). The 2012 U.S. Pet Ownership and Demographics Sourcebook.
- Animal Health Alliance (2013). Pet Ownership in Australia 2013 – summary.
- Brooks, H., Rushton, K., Walker, S., Lovell, K., & Rogers, A. (2016). Ontological security and connectivity provided by pets: A study in the self-management of the everyday lives of people diagnosed with a long-term mental health condition. *BMC Psychiatry*, 16(1), 409. <http://dx.doi.org/10.1186/s12888-016-1111-3>.
- Cattell, V., Dines, N., Gesler, W., & Curtis, S. (2008). Mingling, observing, and lingering: Everyday public spaces and their implications for well-being and social relations. *Health Place*, 14(3), 544–561.
- Christian, H., Wood, L., Nathan, A., Kawachi, I., Houghton, S., Martin, K., & McCune, S. (2016). The association between dog walking, physical activity and owner's perceptions of safety: Cross-sectional evidence from the US and Australia. *BMC Public Health*, 16(1), 1010. <http://dx.doi.org/10.1186/s12889-016-3659-8>.
- Cutt, H., Giles-Corti, B., Knuijman, M., & Pikora, T. (2008). Physical activity behaviour of dog owners: Development and reliability of the Dogs and Physical Activity (DAPA) tool. *Journal of Physical Activity & Health*, 5(Suppl 1), S73–S89.
- George, D., & Mallery, P. (2012). *IBM SPSS statistics 21: step by step*. Boston: Allyn and Bacon.
- Goldstein, H. (2003). *Multilevel statistical models*. London: Edward Arnold.
- Guéguen, N., & Ciccotti, S. (2008). Domestic dogs as facilitators in social interaction: An evaluation of helping and courtship behaviors. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People Animals*, 21(4), 339–349.
- Halpern, D. (2005). *Social capital*. Cambridge, UK: Polity Press.
- Handlin, L., Nilsson, A., Ejdebäck, M., Hydring-Sandberg, E., & Uvnäs-Moberg, K. (2012). Associations between the psychological characteristics of the human–dog relationship and oxytocin and cortisol levels. *Anthrozoos*, 25(2), 215–228.
- Hunt, S., Hart, L., & Gomulkiewicz, R. (1992). Role of small animals in social interactions between strangers. *Journal of Social Psychology*, 132, 245–256.
- Kawachi, I., Kennedy, B., Lochner, K., & Prothrowstith, D. (1997). Social capital, income inequality, and mortality. *American Journal of Public Health*, 87(9), 1491–1498.
- Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings*. Oxford University Press.
- Lang, R., & Hornburg, S. (1998). What is social capital and why is it important to public policy? *Housing Policy Debate*, 9(1), 1–16.
- McNicholas, J., & Collis, G. (2000). Dogs as catalysts for social interactions: Robustness of the effect. *British Journal of Psychology*, 91(Pt 1), 61–70.
- Messent, P. (1983). Social facilitation of contact with other people by pet dogs. In A. Katcher, & A. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 37–46). Philadelphia: University of Pennsylvania Press.
- Nagasawa, M., Kikusui, T., Onaka, T., & Ohta, M. (2009). Dog's gaze at its owner increases owner's urinary oxytocin during social interaction. *Hormones and Behavior*, 55(3), 434–441. <http://dx.doi.org/10.1016/j.yhbeh.2008.12.002>.
- Newby, J. (1997). *The pact for survival: Humans and their companions*. Sydney: ABC Books.
- Onyx, J., & Bullen, P. (1997). *Measuring social capital in five communities in NSW: An analysis*. University of Technology Sydney.
- PIAS (2010). *Pets in the city*. Victoria, Australia: Petcare Information and Advisory Service Australia Pty Ltd.
- Putnam, R. D. (2001). *Bowling alone: The collapse and revival of American community*. New York: Simon and Schuster.
- Robins, D., Sanders, C., & Cahill, S. (1991). Dogs and their people: Pet-facilitated interaction in a public setting. *Journal of Contemporary Ethnography*, 20(1), 3–25.
- Schneider, M., & Harley, L. (2006). How dogs influence the evaluation of psychotherapists. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People Animals*, 19, 128–142.
- Turkle, S. (2012). *Alone together*. Basic Books.
- Wood, L. (2005). *Social capital, mental health and the environments in which people live* (PhD thesis) Perth: The University of Western Australia.
- Wood, L. (2010). Community benefits of human animal interactions... the Ripple effect. In P. McCardle, S. McCune, L. Esposito, J. Griffin, & L. Freund (Eds.), *The role of pets in children's lives: Human-animal interaction in child development, health and therapeutic intervention*. Baltimore, MD: USA Brooks Publishing.
- Wood, L. (Ed.). (2009). *Living well together: How companion animals can help strengthen social fabric*. Melbourne: Petcare Information and Advisory Service and CBEH, School of Population Health, The University of Western Australia.
- Wood, L., Giles-Corti, B., & Bulsara, M. (2005). The pet connection: Pets as a conduit for social capital? *Social Science and Medicine*, 61(6), 1159–1173.
- Wood, L., Giles-Corti, B., Bulsara, M., & Bosch, D. (2007). More than a furry companion: The ripple effect of companion animals on neighborhood interactions and sense of community. *Society and Animals*, 15(1), 43–56.
- Wood, L., Martin, K., Christian, H., Nathan, A., Lauritsen, C., Houghton, S., & McCune, S. (2015). The pet factor – Companion animals as a conduit for getting to know people, friendship formation and social support. *PloS One*, 10(4), e0122085. <http://dx.doi.org/10.1371/journal.pone.0122085>.
- Zak, P. J., Kurzban, R., & Matzner, W. T. (2005). Oxytocin is associated with human trustworthiness. *Hormones and Behavior*, 48(5), 522–527. <http://dx.doi.org/10.1016/j.yhbeh.2005.07.009>.
- Zimalag, U., & Krupa, T. (2009). Pet ownership as a meaningful community occupation for people with serious mental illness. *American Journal of Occupational Therapy*, 63(2), 126–137.